UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE
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AGRICULTURAL EXPERIMENT STATION
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THE PREVENTION OF HOG CHOLERA

INTRODUCTORY NOTE.—The value of the Dorset-Niles anti-hog cholera serum in preventing hog cholera, has been demonstrated beyond question. Over twenty state governments have taken steps to protect their hog-raising industries by appropriating funds to establish plants for the manufacture of the serum. California has appropriated $16,000 for this purpose, the plant to be established at the California Agricultural Experiment Station, Berkeley. The serum will be sold by the Regents of the University of California at actual cost of production, and, in cases of outbreaks of hog cholera, will be furnished free to hog raisers in amounts not exceeding five hundred cubic centimeters (about one pint, enough to immunize twenty pigs averaging one hundred pounds). Hypodermic syringes and other necessary equipment in using the serum can also be secured from the University.

In outbreaks of hog cholera, the best way to stop further losses and stamp out the disease is by the use of anti-hog cholera serum. All hogs on the infected premises, exposed to contagion, but not visibly ill, should be immunized with the serum; those not exposed may be treated by the simultaneous method, using both serum and vaccine.

One of the most successful uses of the serum is to immunize valuable pure-bred hogs before shipment.

C. M. HARING, Veterinarian.

GENERAL PREVENTIVE MEASURES.

All that is necessary to prevent hog cholera is to keep the germ of the disease away from the herd. It has been shown that in the vast majority of cases this germ is transported mechanically, in the bodies of sick hogs and on the feet of men, or animals, including birds. It thus follows that the chances of an outbreak of hog cholera will be greatly lessened, if not completely avoided, if a herd is protected from these carriers of infection. The enforcement of a complete quarantine is, however, not practicable under average farm conditions, and the best that can be hoped for is the lessening of the opportunity for infection by placing the herd on a part of the farm that will be the least accessible to men or animals from other farms. Hog lots should never be located near public roads if this can be avoided. All newly purchased stock should be kept separate from the main herd for at least thirty days.

In addition to protecting the herd by methods of quarantine, careful attention should be given to the general health of the herd. The hogs should be provided with clean, dry, sleeping places, and the lots and feeding troughs should be kept clean. It is well, occasionally, to scatter slaked lime about the lots and to wash and disinfect the

troughs. Probably the best disinfectant for this purpose is the compound solution of cresol (U. S. P.), which can be prepared at any drug store. One part of this should be mixed with thirty parts of water and the troughs scrubbed with it. The disinfectant is then washed out of the troughs with water.

After an outbreak of hog cholera the yards and pens should be thoroughly cleaned, all dead hogs should be burned or buried deep with quicklime, the litter should be collected and burned, and lime scattered freely over the ground. The sheds and hog houses should be washed thoroughly with the solution of cresol as above described before new stock is brought on the place. Feeding troughs that have been used by sick pigs should be burned if made of wood, but if this is not practicable, they should be scrubbed clean and thoroughly soaked with cresol solution, the latter being washed out before the troughs are used again.

It is possible to start an outbreak of hog cholera by bringing into the herd hogs that have had the disease and have apparently recovered. We have no definite information concerning the length of time that such hogs may be able to communicate the disease to others, but for safety's sake two or three months should be allowed to elapse after complete recovery before placing such an animal with susceptible pigs, and then only after washing or dipping in a disinfectant solution (compound solution of cresol, 1 to 100).

In Circular No. 3 of the California Agricultural Experiment Station is given the following formula for a medicine which was used many years ago as a preventive and cure for hog cholera:

	Pounds.
Wood charcoal	1
Sulphur	1
Sodium chloride	2
Sodium bicarbonate	2
Sodium hyposulphite	2
Sodium sulphate	1
Antimony sulphid (black antimony)	1

Experience has shown, however, that this medicine is not to be regarded as a cure or preventive in the true sense of the words, but it is, nevertheless, a very good condition powder. This powder is mixed with the feed in the proportion of a large tablespoonful to each two hundred pounds' weight of hogs to be treated, and should not be given oftener than once a day. This medicine cannot be relied upon to prevent the occurrence of disease, except in so far as it improves the general health of the hogs. Therefore, even though this remedy be used, strict attention must be given to quarantine and

sanitary measures if the disease is to be warded off when in the neighborhood.

PREVENTION BY INOCULATION.

Careful and persistent attention to preventive measures, such as quarantine, disinfection, proper feeding, etc., on the part of farmers generally, would no doubt result in a material reduction in the yearly losses from hog cholera, and the importance of observing these precautions cannot be overestimated. However, as it is regarded as impracticable to enforce a general and completely effective quarantine, the Bureau of Animal Industry has endeavored for a number of years to find a medicine or serum which could be used for preventing hog cholera or for curing hogs sick of that disease. It is a well-known fact that hogs which have recovered from hog cholera are thereafter immune from the disease. The experiments of the Bureau of Animal Industry resulted in the discovery that when such immunes are injected with the blood from a sick hog the immune is not made sick, but as a result of this injection its blood acquires the power to protect other hogs from hog cholera. The details of the early experiments which served to establish this fact are given in Bureau of Animal Industry Bulletin 102.* Since that bulletin was issued a great deal of additional work has been carried out, and it has been established beyond question that the early observations were correct, and that it is entirely possible to protect hogs if they are treated with serum from a properly treated immune hog.

The method of producing this serum is briefly as follows:

A vigorous immune hog—that is, one which has recovered from an attack of hog cholera or one which has been exposed to the disease without contracting it—is treated with a large quantity of blood from a hog sick of hog cholera. After a week or two blood is drawn from the immune by cutting off the end of the tail. After standing, the blood clot is removed and the serum or fluid portion of the blood is mixed with a weak solution of carbolic acid and filled into sterilized bottles. We have in this fluid portion of the immune's blood the serum which will protect hogs from hog cholera. This serum is used in either one of two ways, namely (1), the serum inoculation, and (2), the simultaneous inoculation. These two methods of treatment are carried out as follows:

Serum Inoculation.—The hogs which are to be protected are injected on the inside of the hind leg with a suitable dose of the serum alone. This injection will serve to protect hogs from hog cholera for

* Can be obtained only from Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 15 cents.

several weeks and, in some cases, for a longer time. But if the hog is not exposed to hog cholera within a few weeks after this treatment, the immunity which is conferred by the serum will gradually lessen in degree and the hog may again become susceptible. If, however, the hog is exposed to hog cholera within a short time after the injection of the serum, the immunity becomes, so far as experiments have shown, of permanent and lifelong duration.

From what has been said, it will be seen that the injection of the serum alone is especially to be recommended in cases where there is immediate danger of exposure, especially when valuable hogs are carried to fairs, and in herds where the disease has already broken out but has not progressed very far. In herds of this character all of the well animals may be treated, and even in the case of slightly sick animals much good may be accomplished by the serum injection.

Simultaneous Inoculation.—In this form of vaccination the same serum is used as is employed when the serum alone is used, but in addition to the serum there is injected on the opposite side of the body, in the same manner as the serum, a very small amount of blood taken from a hog sick of hog cholera. This simultaneous injection of serum and virulent blood confers upon the injected pig a permanent and lasting immunity, and is therefore to be recommended in cases of well herds which may not be exposed for some months after the treatment.

Safety of the Methods.—Properly prepared serum when used alone, without the employment of blood from a sick hog, is entirely harmless and incapable of giving rise to an attack of hog cholera. Nor does this injection interfere in any way with the growth of the treated hogs.

The simultaneous inoculation, involving as it does the use of a disease-producing virus, requires much more care when employed than does the serum-alone inoculation, for, if through careless preparation or from any other cause the serum should be weaker than is required, injury to the vaccinated hog might result. This danger, which is extremely slight when carefully tested serum is used, is met with in practically all processes which are now employed for producing a permanent and lasting protection against infectious diseases, and although it would be very desirable to eliminate even this slight element of danger, we can hardly expect to do this without at the same time sacrificing to some extent the high degree of immunity and the prolonged protection which follows the simultaneous method in its present form.

Practically, in deciding which method to use one must be governed

largely by the length of immunity which is required. If this is needed for only a few weeks, or if the treatment can be repeated at short intervals, as in the case of exceptionally valuable pure-bred hogs, where the increased cost would not be objected to, the serum alone may be used. In other cases the simultaneous method is recommended. In either process of vaccination it is considered highly desirable for the treatment to be applied by competent veterinarians who have had special training in this class of work, and only such skilled men should employ the simultaneous process. For the present, virulent blood for the simultaneous method will not be furnished for use unless the work is to be done by a qualified veterinarian. After treatment by the simultaneous method the herd should be kept under observation for ten days or two weeks, and if any of the inoculated hogs show serious symptoms of disease the herd should be immediately re-treated with the serum alone. When properly performed, the simultaneous inoculation does not seem to injure the hog or to interfere with its growth in any way, and if the precautions indicated above are taken, it is regarded as safe enough for practical use.

The serum is carefully tested before it is sent out.—All serum distributed by the California station will be carefully tested for potency before it is sent out. The standard of potency is that adopted by the Bureau of Animal Industry, United States Department of Agriculture.

Practical Tests.—Field tests made by the United States Bureau of Animal Industry in an extended manner on farms and at stockyards under practical conditions have proven beyond question the value of the Dorset-Niles serum. In these practical experiments a number of hogs were generally left untreated, so that we might be sure that the herd actually had hog cholera and also be able to determine better the action of the serum. In these tests approximately two thousand hogs, located on forty-seven separate farms, were treated. Some of the herds treated were apparently perfectly well at the time, but were in the neighborhood where hog cholera was prevalent. In other cases the disease was just beginning, as indicated by the sickness of one or two animals. In others the disease had progressed to a considerable extent, a number of the animals in the herd being sick at the time of treatment; and in still another class of herds the hogs had been exposed to disease by contact with sick animals, but had not developed symptoms of illness at the time of treatment. The tests were carried out under farm conditions, and aside from the serum injections no attempt was made to save the treated hogs. Upon summarizing the results at the end of the season it was found that more than 85 per cent.

of the treated hogs had been saved in the herds that were sick at the time of treatment, while of the hogs left untreated in the same herds only 25 per cent. survived; more than 95 per cent. of the treated animals were saved in the herds which had been exposed at the time of treatment, while of the untreated hogs in the same herd only 11 per cent. survived; of the treated hogs in the herds that did not become exposed until after the treatment none were lost, whereas only 35 per cent. of the untreated hogs in the same herds survived.

While in practice the serum may not always give as good results as these, there can be no doubt that if used properly and in the early period of an outbreak of hog cholera it will effect a very large saving.

Results of the use of the Dorset-Nile serum in other states.—During the past two years the success of the Dorset-Niles serum in saving hogs from cholera has, in several important hog-raising states, confirmed the experiments of the United States Bureau of Animal Industry just mentioned. In Kansas the mortality from hog cholera has been reduced from 80 per cent. to 10 per cent. in infected herds, when serum has been administered at the beginning of the outbreak. Equal results have been obtained in many of the other states. The value of this treatment is evident when the cost of vaccination and the loss without treatment, are considered. The 10 per cent. loss can be accounted for in part by the fact that some hogs are infected, without yet showing visible symptoms at the time of vaccination. The serum is only a preventive, not a cure.

HOG CHOLERA IN CALIFORNIA.

The losses from cholera in hogs in this state have been extensive. This is evidenced by the report of the State Veterinarian for the two years ending June 30, 1910. He says:

> Numerous reports of deaths in hogs from cholera were received and investigated by this office. In the following counties the losses from this disease were quite extensive: San Luis Obispo, Fresno, Los Angeles, Mendocino, Kings, Tehama, Santa Cruz, San Joaquin, Tulare, Santa Clara, Monterey, Merced, Colusa, and Shasta. Hog cholera is, however, pretty well distributed throughout the hog-raising sections of this state, and acts not only as a menace to hog raising, but also prevents the natural development of this important industry. California is particularly adapted for the raising of hogs. The large areas in this state which have in the past few years been turned into dairies through the development of irrigation, offer an excellent field for the production of pork. The by-products from these dairies, as well as the class of feed that can be grown under the system of irrigation, insures the production of pork at a relatively low cost. To what extent hog raising can be reached in California is only limited by the protection that can be afforded hog raisers against the ravages from hog cholera.
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> At the present time we raise a very small part of the pork which is consumed in this state. Nearly all of our pork is brought into California in refrigerator cars in sweet pickle from the packing centers of the Middle West. For fresh

pork many carloads of hogs are purchased by California packers in other states and hauled out here for slaughter. Why this condition should exist in an agricultural state like California, where every facility exists for hog raising, sufficient to supply at least our own consumption of pork, is undoubtedly due, in the opinion of the writer, to the fact that a hog breeder is afraid to take chances with cholera decimating his herd. This opinion is shared by many others in this state. The deaths from this disease are so rapid that under present conditions in California it spreads rapidly from one animal to another until in a very short time practically the entire herd is dead.

It appears from the above data, and from investigations made by veterinarians of the California Agricultural Experiment Station that losses have occurred in nearly every hog-raising district of the state.

Anti-hog Cholera Serum provided for California.—In response to a demand by many interested in swine raising, the following bill was prepared, and passed the State Legislature in 1911. Six thousand dollars of the appropriation became available June 21, 1911, but to expedite the work of establishing the serum plant, the Regents of the University of California advanced three thousand dollars soon after the Governor signed the bill, and the work of preparation was prosecuted with all possible diligence.

An Act to provide for the preparation and distribution of serums or vaccines for the prevention of the disease known as Cholera in Hogs in the State of California, making an appropriation therefor and prescribing the duties of the controller and treasurer in relation thereto.

The People of the State of California, represented in Senate and Assembly, do enact as follows:

Section 1. The Regents of the University of California are hereby directed to cause to be prosecuted with all possible diligence, through the Agricultural Experiment Station, the preparation of serums or vaccines that will produce immunity in hogs against the disease known as cholera.

Sec. 2. The Regents of the University of California are hereby further authorized and directed to furnish such serums or vaccines in quantities not exceeding five hundred cubic centimeters as soon as possible after this act takes effect free of charge to any bona fide resident of the State of California who is engaged in the raising of hogs, upon application by such bona fide resident hog raiser.

Sec. 3. The Regents of the University of California are also hereby further authorized and directed to furnish any bona fide resident of this state, who is engaged in the raising of hogs, such serums or vaccines in quantities in excess of five hundred cubic centimeters, upon the applicant paying therefor the actual cost of production of such serums or vaccines.

Sec. 4. It is herewith provided that no serums or vaccines shall be furnished free of charge to anyone unless the applicant shall have first furnished sufficient evidence that the disease known as cholera exists among his hogs or among the hogs in his immediate neighborhood, and in such case evidence shall be furnished by said applicant that there is danger of the disease being communicated to the applicant's hogs.

Sec. 5. Any person who shall sell, give away, or misuse any of the serums so furnished shall, upon conviction thereof be deemed guilty of a misdemeanor, and be punished as in such cases provided by law.

Sec. 6. The Director of the Agricultural Experiment Station shall obtain and establish such assistance, equipment, materials, appliances, apparatus, and other necessary incidentals as may be necessary to the successful prosecution of this work within the appropriation herein specified.

SEC. 7. The sum of sixteen thousand ($16,000.00) dollars is hereby appropriated out of any money in the state treasury not otherwise appropriated, six thousand ($6,000.00) dollars of which shall be available for the balance of the sixty-second fiscal year and ten thousand ($10,000.00) dollars of which shall be available during the sixty-third and sixty-fourth fiscal years for the use of said Experiment Station to be expended by the Regents of the University of California in carrying out the purposes of this act, and the State Controller is hereby authorized and directed to draw his warrant for the same, and the State Treasurer is hereby directed to pay such warrant.

SEC. 8. All money appropriated under this act, and all money received for the sale of said serums or vaccines as provided for in section three of this act, shall be paid to the Regents of the University of California, and shall be expended under the direction of the Director of the Agricultural Experiment Station of said University for the specific purposes herein named.

Cost of the Serum.—Owing to the short time that this experiment station has been making serum, it is not possible at the present time to estimate the average cost of production for the year. Every economy, not detrimental to the production of a potent serum will be practiced, and the price fixed at actual cost of production. For the time being, the price has been fixed at 2½ cents per cubic centimeter, which would make the cost of the dose for a hundred pound hog, 50 cents.

How to secure Anti-hog Cholera Serum from the University.—All applications for serum should be made out on blanks furnished for that purpose. These application blanks may be obtained by writing to the Director of the Agricultural Experiment Station, Berkeley, California, or to the State Veterinarian, Sacramento, California. Copies have been sent to the County Live Stock Inspectors in the various counties having such officials, and an effort has been made to place application blanks in the hands of as many hog raisers and veterinarians as possible.

In cases of emergency where no application blanks are available, the following form may be filled out and sent by telegraph as a night letter, or by mail as a special delivery letter:

DIRECTOR OF THE AGRICULTURAL EXPERIMENT STATION,
BERKELEY, CALIFORNIA.

Send hog serum C. O. D. to

.....
(Insert name of express office here)

or ..... hogs, total weight .....
(Number of hogs) (Total weight in pounds)

Before using serum, I agree to fill out, sign, and mail to you ' pplication blanks furnished with serum. I am a resident of Californ

(Signed) .....
(Signature of owner of hogs)